Remarks

INTRODUCTION

Applicant thanks the Examiner for carefully considering the subject application.

Applicant has amended pending claims 5, 6 and 9 to better describe the invention. Further, Applicant has added claims 14-21. Applicant requests that all of the pending claims 5-7, 9-11, and 14-21 be allowed.

REJECTION OF CLAIMS 5-7 UNDER U.S.C. 102(e)

The Examiner has rejected claims 5-7 under 35 U.S.C. 102(e) as being anticipated by Tengblad (U.S. Patent 5,867,982). Applicant respectfully submits that the rejection of claims 5-7, as amended, is improper because Tengblad does not teach all of the limitations of claim 5.

Claim 5 recites:

> A method for controlling an air-fuel mixture in an internal combustion engine, comprising:
> determining a temperature of a downstream emissions control device located following a upstream emissions control device;
> oxidizing hydrocarbons stored in said downstream device when said temperature of said downstream device is greater than a predetermined temperature by providing air in a location following said upstream emissions control device and before said downstream emissions control device; and
> adjusting the air-fuel ratio in the engine rich of stoichiometry during oxidation of said hydrocarbons.

Before discussing the claims in detail, however, Applicant believes it would be helpful to first review the Background and Summary Sections of the application. Specifically, the inventor herein has found a way to achieve advantageous HC purging operation, while at the same avoiding increases in HC, CO, or

NOx emissions. Further, this is accomplished using a system that allows the emission control device storing HC to avoid the high exhaust temperatures near the engine's exhaust manifold. The following three points illustrate the inventive solution found by Applicant.

(1) First, by providing air in a location following an upstream emissions control device, but before the downstream emissions control device, it is possible to provide sufficient oxygen to oxidize HC released from the downstream device.

(2) Second, since the added air is introduced following the upstream device, efficient conversion of NOx can be obtained in the upstream device. This added air also provides for improved conversion (in the downstream device) of any HC and CO in the rich exhaust gas that may breakthrough the upstream device.

(3) Third, by storing HC in a device in a downstream position, the downstream device can avoid higher feed gas temperatures that may reduce the trapping performance of the device.

Referring now to Tengblad, several differences from claim 5 can be found.

First, Tengblad uses secondary air in a different way from that claimed in claim 5 since Tengblad adds secondary air upstream of the catalytic converter. Specifically, as can gathered from column 7, lines 66-67, and column 8, lines 1-2, the "…additional air is be [sic] supplied by means of an air supply system in the form of an air pump 16, the output of which is fed into the exhaust gas upstream of the catalytic converter". Further, Figure 1 clearly depicts an air pump located upstream of a first and second brick. As such, the reference fails to show "providing air in a location following

said upstream emissions control device and before said downstream emissions control device" as set forth in claim 5.

Further, it makes sense that Applicant and Tengblad employ different methods since each is directed to solving a different problem. Namely, Tengblad injects air upstream of a catalyst, in a hydrogen rich exhaust mixture, in an effort to rapidly warm the catalyst. On the other hand, Applicant injects air after a catalyst to oxidize trapped hydrocarbons in a downstream device. Applicant has placed the hydrocarbon trapping device in the downstream location to avoid higher feed gas temperatures that may reduce the performance of the trapping device, and to ensure that any HC or CO that breaks through the upstream catalyst can be converted in the downstream device. Conversely, Tengblad attempts to quickly increase exhaust gas temperatures in an effort to reduce catalyst light-off time.

Based on the foregoing, Applicant believes that the elements of Claim 5 clearly distinguish the Tengblad reference. Therefore, Applicant respectfully requests allowance of Claim 5, and Claims 6, 7, and 14-16, based on the fact that they depend from Claim 5 and further limit the scope of Claim 5.

REJECTION OF CLAIMS 9-10 UNDER U.S.C. 103(a)

The Examiner has rejected claims 9 and 10 under 35 U.S.C. 102(a) and has cited Tengblad in view of art recognized equivalents. Applicant believes that the rejection is improper.

Claim 9 Recites:

> A system controlling an air-fuel ratio in an internal combustion engine, comprising:
> a hydrocarbon trap positioned in an exhaust path downstream of a first emission control device, said first emission control device being located downstream of said engine;

an air supply device positioned downstream of said first emission control device to supply air upstream of said hydrocarbon trap; and

a controller configured to activate said air supply device, delivering oxygen to said hydrocarbon trap when temperature of said hydrocarbon trap is greater than a predetermined temperature, said controller further configured to adjust an air-fuel ratio in said engine rich of stoichiometry during said air delivery.

Applicant first objects to the Examiner's use of art recognize equivalents. Applicant does not accept or acquiesce to the Examiner's characterization and use of Official Notice.

Further, whether or not the use of sensors and estimates are equivalent in fact says nothing about the motivation for one skilled in the art for making the modification or combination. Tengblad does not describe any way to ascertain a temperature of the catalyst. Rather, Tengblad, in column 8, line 64, simply refers to a blocking mechanism that might be used "… after catalyst light-off temperature is reached …".

Further, Claim 9 also requires "an air supply device located downstream of said first emissions control device". Nowhere, does Tengblad show or describe introducing air to an exhaust system after a first emissions device. As such, the rejection is improper.

Claim 10 further depends from Claim 9. As such, based on the above-mentioned arguments, Applicant respectfully submits that claims 9-10 should be allowed.

REJECTION OF CLAIM 11 UNDER U.S.C 103(a)

The Examiner has rejected Claim 11 35 U.S.C. 103(a) and has cited Hirota et al. (U.S. Patent 6,367,246) in view of legal precedent.

Claim 11 Recites:

> A method for controlling an engine, said engine communicating with a first emission control device, said first emission control device communicating with a second emission control device, said method comprising:
> determining a temperature of said second emission control device;
> combusting an air-fuel mixture rich of stoichiometry in an engine cylinder to reduce NOx stored in said first emission control device; and
> applying oxygen upstream of said second emission control device to oxidize hydrocarbons stored in said second emission control device and hydrocarbons from said combusted rich air-fuel mixture when said temperature of said second emission control device is greater than a predetermined temperature.

Applicant believes the rejection of Claim 11 is improper and that the Examiner has misapplied the cited legal precedent (*Nerwin v. Erlichman*, 168 USPQ 177,179). The Examiner states:

> It would have been obvious to one having ordinary skill in the art at the time the invention was made to use two emission control devices being separated from each other, since it has been held that interchanging an integral part, for plural parts involves only routine skill in the art.

First, the Examiner has mischaracterized Applicant's claims, since Applicant has not merely divided one emission control device into two emission control devices. As described in the specification and highlighted above, Applicant has achieved certain advantages due to the use of air introduced between the upstream and downstream devices, thus allowing the upstream and downstream device to perform different functions. None of the applied art shows or suggests such a configuration, or the associated advantages that can be achieved. Further,

there is absolutely no description in the applied references of how to achieve these advantages by a multiplicity of identical components or indiscriminate arrangements.

Second, Applicant respectfully submits that the Examiner has misapplied legal precedent. Specifically, looking to the details of the caselaw cited by the Examiner, *Nerwin* in fact supports Applicant's, not the Examiner's, position. Briefly reviewing the facts in *Nerwin*, this case relates to an interference before the Patent Office Board of Patent Interferences, decided May 29, 1969. At issue is whether a single structure can be regarded as two elements. The Board cites CCPA precedent, which it later follows. That precedent states:

> …while a given structure may in one sense be considered a single element, in another sense it may be so formed as to consist of several elements, depending upon the functions to be performed by such elements.[1]

Thus, in the present case, Hirota et al. has absolutely no description of using its single device along with oxygen applied upstream to oxidize both (1) stored hydrocarbons, and (2) hydrocarbons from a combusted rich air-fuel mixture used to reduce NOx. Further, the columns and lines cited by the Examiner in Hirota et al. show changing direction of flow in the exhaust, a function which is totally different from that claimed by Applicant. As such, the legal precedent undercuts, rather than supports, the rejection, since there is no disclosure in Hirota et al. of performing the acts claimed by claim 11.

Finally, as discussed in the May 28, 2003 Office action reply, Hirota et al. does not describe "determining a temperature of said second emission control device," nor dies it

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[1] Reed v. Edwards, 26 C.C.P.A. 901, 905 (emphasis added).

describe "applying oxygen upstream of said second emission control device … when said temperature of said second emission control device is greater than a predetermined temperature". The Examiner has cited column 5, lines 53-67, and column 6, lines 1-6, as support for the rejection. However, Applicant has inspected these columns and lines, but found no such disclosure. This citation is reproduced below, and Applicant requests clarification of where such disclosure can be specifically found:

> Specifically, in the case where the regeneration of the particulate filter 18 is required, the switch valves 25, 26 are located at the second position, respectively, and the secondary air pump 23 and the burner 29 are both activated. As a result, the exhaust gas discharged from the engine flows through the bypass pipe 21 bypassing the particulate filter18. The secondary air, which is heated by burner 29 after discharged from the secondary air pump 23, flows through the particulate filter 18 from the exhaust gas downstream end 18d and flows out of the exhaust gas upstream end 18u. Thus, the particulates trapped in the particulate filter 18 are burnt, and the particulate filter 18 is regenerated. Note that the secondary air is heated so that the temperature of the particulate filter 18 increases to beyond 600 °C., for example.
>
> In this way, according this embodiment, the secondary air is rendered to flow reversely from the exhaust gas downstream end 18d toward the exhaust gas upstream end…

Moreover, Applicant's Claim 11 also describes supplying oxygen upstream of a second device based on the temperature of the second device. Applicant can find no description in Hirota et al. of correlating purging of a device to the temperature of the device. Rather, referring to column 6, lines 41-43, Hirota et al. state that "…the particulate filter 18 is regenerated in accordance with the amount of particulates trapped in the

particulate filter." Thus, Hirota et al. heat the air that is provided to oxidize particulates; but they do not regenerate the particulate trap based on the temperature of the trap.

Also, Applicant's Claim 11 contains still other limitations that cannot be found in the Hirota et al. patent. For example, Claim 11 describes introducing air and combusting a rich air-fuel mixture when the temperature of the second emission control device exceeds a predetermined threshold. Conversely, Hirota et al., as shown in Figure 5, steps 73-74 and 78-79, show deactivation of secondary fuel whenever secondary air is activated. Thus, it is likely that the engine is producing a lean mixture, not a rich mixture, when the air pump is activated.

Therefore, based on the before-mentioned missing elements of Applicant's Claim 11, Applicant believes that Claim 11 should be passed to issuance.

NEW CLAIMS

Claims 14-16 further depend from Claim 5. As such, based on the above-mentioned arguments, Applicant respectfully submits that claims 14-16 be allowed. Also, Claim 17 contains the elements of Claim 5 and additional limitations. Since claim 17 further limits Claim 5 and since Claims 18-21 further depends from Claim 17 Applicant respectfully requests allowance of Claims 17-21.

CONCLUSION

Based on the foregoing comments, the above-identified application is believed to be in condition for allowance, and such allowance is courteously solicited.

Please charge any cost incurred in the filing of this Amendment, along with any other costs, to Deposit Account 06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505. A duplicate copy of this sheet is enclosed.

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on November 12, 2003.

Erin Filsinger
Date of Signature: November 12, 2003

Respectfully submitted,

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